

The American Midland Naturalist

Devoted to Natural History, Primarily
that of the Prairie States

Published by the University of Notre Dame,
Notre Dame, Indiana

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THE MEXICAN SPECIES OF *TILIA*

By

BENJAMIN FRANKLIN BUSH

PRICE \$1.50 A Year

SINGLE NUMBERS 30 CENTS

FOREIGN, 6s. 6d.

Entered as second-class matter at Notre Dame, Indiana. Acceptance for mailing at
special rate of postage provided for in section 1103, Act of October 3, 1917,
authorized on July 3, 1918.

THE UNIVERSITY PRESS, NOTRE DAME, INDIANA

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The American Midland Naturalist

PUBLISHED BI-MONTHLY BY THE UNIVERSITY OF NOTRE DAME.
NOTRE DAME, INDIANA.

Vol. XI.

SEPTEMBER, 1929.

No. 11.

THE MEXICAN SPECIES OF *TILIA*.

BENJAMIN FRANKLIN BUSH.

The first reference to the genus *Tilia* in Mexico I have been able to find, is by Schlechtendal in *Linnaea* 11: 377. 1837, where he described *Tilia mexicana*, collected by Schiede, and gives as the type locality "Cuesta grande de Chiconquiaco."

Schiede probably collected his specimens the year preceding the publication of *T. mexicana*, and for nearly three-quarters of a century no other species of *Tilia* was known from Mexico, everything that was collected being referred to this species, which no one seemed to know anything about.

In 1905 Rose¹ described two species of *TILIA* from Mexico, *T. occidentalis* and *T. Houghii*, and in 1906 distributed two others under the names *T. Pringlei* and *T. cordata*, apparently intending to publish them, but did not.

There are now five species of *Tilia* indicated for Mexico, either published or distributed under herbarium names with specimens, including *T. cordata* Rose, a species no one seems to have taken up, but which is evidently a Mexican species, whatever it may be.

¹ J. N. Rose, Contrib. U. S. N. Herb. 8: 4. 317 and 318. 1905.

Engler² in his Monograph of the genus *TILIA*, treats Schlechtendal's *T. mexicana* as a good species, which he says was collected by Schiede at "Cuesta grande de Chiconquiaco," in the State of Nuevo Leon.

Engler promptly reduces Rose's *T. occidentalis* and *T. Houghii* to varieties under *T. mexicana*, and makes Rose's unpublished *T. Pringlei* a form under this variety *Houghii*, saying that it was the exact equivalent of *T. mexicana*, thereby leaving nothing to stand for the species *T. mexicana*, which seems to me to be like trying to picture a tree by drawing the branches only, or building a house without a foundation.

Sargent³ in his *TILIA* paper mentions *T. mexicana* as being collected near Chiconquiaco, State of Hidalgo, and refers some specimens collected by Dr. Palmer under No. 118, to *T. floridana*, but this No. 118 of Dr. Palmer's collection proves to be a mixture of several species.

Standley⁴ in his *Trees and Shrubs of Mexico*, recognizes four species of *TILIA*, and he admits that nothing is known of *T. mexicana*, which he says came from Cuesta Grande de Chiconquiaco, State of Veracruz. By the very fact of Standley capitalizing the adjectival term "grande," shows conclusively that he thought the type locality as given by Schlechtendal was a town.

From the above it will be seen that *Tilia mexicana* has had a varied experience, the Cuesta grande de Chiconquiaco being located in three different States, and regarded as a town by Engler, Sargent and Standley.

As I understand Schlechtendal's account of *T. mexicana*, the sentence Cuesta grande de Chiconquiaco is "*on a broad slope of (Mount) Chiconquiaco*," in parenthesis mine, which undoubtedly is a mountain somewhere in Mexico, and as there is a town named Chiconquiaco not far west of Veracruz, State

² V. Engler, Monographic du Gattung *TILIA*, 125 and 126. 1909.

³ C. S. Sargent, Notes on North American Trees, 3: 434. 1918.

⁴ P. C. Standley, Contrib. U. S. N. Museum, 23: part 3. 735. 1923.

of Veracruz, it is presumable that the town takes its name from the mountain of the same name not far away.

Much of the ignorance of Mexican species of *TILIA* is due to the fact that there have been but few collections of *TILIA* made in Mexico, and these few collections are scattered throughout the country in various herbaria and collections and mostly in Europe. Even in Mexico, to where I applied for the loan of material, Prof. Herrera kindly wrote me that they have no material of *TILIA* from Mexico in their collection, and that he was unable to enlighten me further about *T. mexicana* than the original publication of Schlechtendal. Several Universities, to whom I have written about getting material from Mexico, advised me that they did not have a single specimen of *TILIA* from Mexico.

Many years will elapse before we can have any knowledge of the species of *TILIA* of Mexico, as we have known some of the most distinct species in North America for over a century before we knew their names, and there are still species here that are not yet named.

In order to understand the species of *TILIA* fully, it is necessary to collect from the same tree at least four times in the same season, once as the flowers are just in bud, that we may see what characters the unfolding leaves have, once when in full flower, which will show if they are large or small, again in mature fruit that its characters may be shown, and last a leading shoot in the Fall to show whether it is glabrous or^s pubescent, and whether the leaves thereon are likewise glabrous or pubescent. Not until this is done, can we expect to make any progress in the study of the Mexican species.

I have examined about 50 sheets of *TILIA* collected in Mexico, nearly all of which were labeled *T. mexicana*, but I did not find a single specimen of that species in the lot, and I was unable to refer all of the material examined to the other three species described by Standley in his *Trees and Shrubs of Mexico*.

I feel very confident that when more and better material

is collected, there will be other species found than the fifteen I now recognize and describe.

It is much to be deplored that this lot of material that I have now examined and studied should not be all deposited in some one institution where any one who becomes interested in the *TILIA* species of Mexico could see what I have done, and have a better idea of the species, than just by seeing the few specimens any one institution has.

For the privilege of having so many Mexican specimens of *TILIA* to study, I am under obligations to Dr. Maxon of the United States National Herbarium, Dr. Rehder of the Arnold Arboretum,, Dr. Rosendahl of the University of Minnesota, Dr. Pammel of the Iowa State College, Dr. Standley of the Field Museum of Natural History, and Mr. Chas. C. Deam of Bluffton, Indiana, all of whom have been most obliging in placing at my disposal these specimens, and have also assisted me in many other ways, all of which I highly appreciate.

To facilitate the placing of specimens of *TILIA*, I submit the following:

KEY TO MEXICAN SPECIES.

Leaves glabrous below at maturity.

Axillary tufts of tomentum wanting; leaves mostly less than 10 cm. long; lateral nerves 3 or 4 pairs. 1. *TILIA MEXICANA*.

Axillary tufts of tomentum present; leaves mostly more than 10 cm. long; lateral nerves 5 to 7 pairs. 2. *TILIA FLORIDANA*.

Leaves not glabrous below, more or less scabrous, stellate-pubescent, tomentose or velvety below (in No. 9 becoming glabrescent) at maturity.

Leaves thin in texture.

Leaves minutely scabrous or thinly stellate-pubescent below, the principal veins on the lower surface of the leaves appressed-scabrous, ovate, ovate-oblong distantly serrulate with small teeth; petioles 2.5-3 cm. long. 3. *TILIA PRINGLEI*.

Leaves pubescent or stellate-pubescent below.

Leaves small, ovate, obovate or oblanceolate, mostly less than 8 cm. long, long-acuminate at the apex, grayish-pubescent, sharply apiculate-serrate; petioles 2-3 cm. long.

4. *TILIA AMBIGUA*.

Leaves medium-sized or large.

Leaves medium-size, mostly over 10 cm. long, round or round-ovate, deeply cordate at the base, minutely serrulate all around; petioles 2-3 cm. long.

5. *TILIA ROTUNDA*.

Leaves large, mostly 12-15 cm. long.

Leaves orbicular or round-oval, deeply cordate at the base, very thin, finely pubescent below, coarsely serrate or dentate; petioles 3-4 cm. long.

6. *TILIA COAHUILANA*.

Leaves not shaped as above.

Leaves ovate, oblong-ovate or round-ovate cordate, tapering to a long acute point, serrulate nearly all around with sharp apiculate teeth; petioles rather long, slender. 3-4 cm. long.

7. *TILIA NELSONI*.

Leaves round ovate, obliquely truncate at the base, densely and finely pubescent below, sharply serrate all around with long slender teeth; petioles very long, slender, 5-6 cm. long.

8. *TILIA LONGIPES*.

Leaves thick in texture.

Leaves brownish-hirsute or tomentose below at first, more or less glabrate at maturity, round-ovate, obliquely truncate or truncate-cordate, mostly less than 8 cm. long, coarsely serrate nearly all around; petioles 3-4 cm. long, stout, covered with spreading brownish hairs.

9. *TILIA OCCIDENTALIS*.

Leaves softly-tomentose, velvety-tomentose or velvety.

Pubescence mostly tomentose, long and spreading on the stems, finer on the lower leaf surface.

Leaves densely grayish stellate-tomentose below, nearly orbicular in outline, oblique at the scarcely subcordate base, sharply serrate nearly all around; petioles short, stout, 2-2.5 cm. long, densely clothed with loose grayish pubescence.

10. *TILIA HOUGHII*.

Leaves with a finer yellowish stellate-pubescence, round-ovate, cordate at the base, minutely serrulate nearly all around, 10-18 cm. long; petioles long, stout, 3-4 cm. long, densely pubescent with fulvous spreading pubescence.

11. *TILIA MORELIANA*.

Pubescence closely velvety-tomentose below.

Leaves small, less than 10 cm. long, round-ovate, oblong-ovate deltoid-ovate, very oblique at the base, often truncate, yellowish below with a fine close tomentum, minutely serrulate or denticulate all around; petioles short, stout, 2-2.5 cm. long, clothed with yellowish or brownish tomentum like the midvein.

12. *TILIA SARGENTIANA*.

Leaves medium-sized or large, mostly over 10 cm. long.

Leaves less than 12 cm. long, of medium size.

Leaves round-ovate, tapering to a long acute point, less than 12 cm. long, densely grayish-pubescent and velvety below, sharply serrate with broad apiculate teeth nearly all around; petioles rather long, very slender, 3-4 cm. long.

13. *TILIA ROSEANA*.

Leaves ovate, broad-ovate, or ovate-oblong, about 10 cm. long, densely brownish-velvety below, minutely serrulate on the margins, or nearly entire; petioles rather long, stout, 3-4 cm. long.

14. *TILIA PERTOMENTOSA*.

Leaves large, well up to 14 cm. or more, round-ovate, subcordate at the base, densely grayish stellate-tomentose below, obscurely serrulate all around or nearly entire; petioles very short, stout, 1-2.5 cm. long, densely clothed with yellowish hirsute tomentum.

15. *TILIA ARSENEI*.

1. *TILIA MEXICANA* Schlecht. *Linnaea* 11: 37. 1837.

TYPE LOCALITY: Cuesta grande de Chiconquiaco (Veracruz.)

Type locality according to Engler, Cuesta grande de Chiconquiaco, Nuevo Leon.

Sargent gives type locality as near Chiconquiaco, Hidalgo.

Standley says the type was from Cuesta Grande de Chiconquiaco, Veracruz.

T. pubescens Bayer, in *Verh. Zool. Bot. Ges.* 12: 56. 1862, according to Engler, l. c. 125, not *T. pubescens* Ait. Hort. Kew. 1789, which is *T. caroliniana* Mill., one of the *pubescentes*, while *T. mexicana* Schlecht is a *glabrata*, which is evidently a mistake on the part of Engler.

Michoacan, Oaxaca, Morelos and Nuevo Leon, Engler, l. c. 125, but there are no specimens to support any of these citations.

"Leaves very oblique at base, not cordate, 10 cm. long and 6 cm. wide or smaller, short-acuminate, with very acute gland-tipped teeth," ex Standley, l. c. 735.

Engler in his treatment of *T. mexicana*, the oldest and for three-quarters of a century the only species known for Mexico, splits this species into two varieties and one form, leaving nothing to stand for Schlechtendal's species. It is inconceivable to me how a species can be made a form of itself, leaving nothing to represent the typical form, which seems to be another case of the snake swallowing itself by beginning at the tail.

As there is no English or Latin description known of *T. mexicana*, I append the following abbreviated description of Schlechtendal:

"Winter-buds small and glabrous; leaves ovate-lanceolate, very much oblique and one-sided at the base, 10 cm. long or less, 6 cm. wide or less, the apex short and narrow, smooth on both sides (nor by any degree barbed in the axils), with two to three pairs of primary veins, acutely serrate with gland-tipped teeth; petioles 3 cm. long or less; bracts tolerably wide; cymes few-flowered; fruits large, the size of a large pea, grayish with dense appressed and slender tomentum," ex Schlechtendal.

SPECIMENS EXAMINED: No specimens of this species except the type collection are known.

2. *TILIA FLORIDANA* Small, Fl. S. E. U. S. 1335, 1903.

TYPE LOCALITY: Jackson County, Florida.

"Leaves 7-12 cm. long, 5-7, 5 cm. wide, short-acuminate, serrate with abruptly acuminate teeth, the lower surface at first with a few scattered stellate hairs, but soon glabrous; bracts long-pedunculate; petals 6-7 mm. long; fruit about 8 mm. long, densely tomentulose," ex Standley.

Coahuila, *Palmer* 118, 1880, as *T. mexicana*, is referred to *T. floridana* by Sargent in *TILIA*, l. c. 434.

Monclova, *Palmer* 118, August 19, 1880, as *T. mexicana*, is referred to *T. floridana* by Sargent in *Tilia*, l. c. 434.

Northeastern Mexico, Sargent, l. c. 738, referring of course to Palmer's No. 118, but this No. 118 of Palmer's collection is a mixture of several species.

Chihuahua, Coahuila and Nuevo Leon, according to Standley, l. c., 735, but no specimens are known from Chihuahua and Nuevo Leon.

3. *TILIA PRINGLEI* Rose, n. sp. in Sched. 1906.

T. mexicana *Houghii* forma *Pringlei* (Rose) Engler, Monog. *TILIA*: 126. 1909.

T. mexicana Schlect., according to Engler, l. c., 126, but certainly a mistake on the part of Engler.

TYPE LOCALITY: Monterey, Nuevo Leon.

Twigs grayish, slender; winter-buds reddish-gray, ovate, plump, pointed, scantily pubescent above, 3-4 mm. long; leaf-blades ovate, ovate-oblong or broadly ovate, tapering to a blunt or somewhat acute point, 6-15 cm. long, 5-10 cm. wide, distantly serrulate with rather small not sharp teeth, dark green and glabrous above, somewhat lighter and minutely scabrous or stellate-pubescent below, the principal nerves on the lower surface of the leaf yellowish, conspicuous, and appressed-scabrous, with tufts of yellowish tomentum in the axils; petioles slender, long, 2.5-3 cm. long, minutely scabrous or nearly glabrous; bracts very large, 7-15 cm. long, 1-2 cm. wide, tapering at the base, broader above, the stalk 2-3 cm. long, glabrous on both sides, conspicuously reticulated, much shorter than the cymes and flowers; peduncles very slender, grayish, 2-4 cm. long, minutely pubescent; pedicels slender, 5-8 mm. long; cymes rather large, or medium sized, many-flowered; branches of the cymes, pedicels and sepals minutely grayish-tomentose; flowers small, 4.5-5 mm. long.

I can not understand why Engler should take up Rose's

name for *T. mexicana* when he knew that Schlechtendal's name was valid, and had priority over Rose's name, if the two are the same, which I am quite sure they are not.

SPECIMENS EXAMINED: Wet canyons, Sierra Madre, above Monterey, Nuevo Leon, *Pringle* 10188, June 5, 1906, TYPE, U. S. N. H. sheets Nos. 1097936 and 462232; U. of Minn. 152957; F. M. of N. Hist. 202140; Sierra Madre above Monterey, Nuevo Leon, *Pringle* 15610, May 25, 1908, type station, Deam Herb.

4. *TILIA AMBIGUA* Sargent, n. sp. in Sched. 1916.

Twigs very slender, slightly grayish-pubescent; winter-buds brownish or reddish, ovate, plump, pointed, about 3 mm. long, thinly pubescent; leaf-blades ovate, obovate, or oblanceolate, 5-10 cm. long, 4-6 cm. wide, sharply apiculate-serrate with low flat teeth, dark green and glabrous above, lighter and densely short grayish pubescent below, slightly oblique at the rounded base, long-acuminate at the apex; petioles very slender, 2-3 cm. long, slightly scabrous or nearly glabrous; bracts 7-10 cm. long, 1-2 cm. wide at apex, tapering to a long cuneate base, on stalks 5-10 mm. long, glabrous or glaucous on both sides, strongly and conspicuously reticulated, somewhat overtopping the cymes and flowers; peduncles 2-3 cm. long, grayish-pubescent; pedicels 5-10 mm. long; cymes small, few—(3-5) flowered; branches of the cymes, pedicels and fruit hoary-tomentose; fruit globose, about 6 mm. wide.

TYPE LOCALITY: Orizaba, Veracruz.

SPECIMENS EXAMINED: Orizaba, Veracruz, *Botteri* 63, no date given, marked "*Tilia ambigua* Sargent, ined.," U. S. N. H. 13523, TYPE: Orizaba, Veracruz, *Botteri* 63, about 1855-57, Arnold Arboretum; Orizaba, Veracruz, *Botteri* 63, about 1855-57, Field Museum of N. Hist. sheet No. 118976, the plant marked 1 on this sheet; N. Y. Bot. Garden, *Botteri* 40, limestone hills, Orizaba, Veracruz, 1856.

5. *TILIA ROTUNDA* n. sp.

Twigs rather stout, yellowish-hirsute; winter-buds brownish, ovate, plump, blunt, 3-4 mm. long; leaf-blades round or round-ovate, abruptly short-acuminate, 8-12 cm. long, 8-9 cm. wide, dark green and glabrous above, much lighter and finely stellate-pubescent below, minutely serrulate all around, the base deeply cordate or truncate-cordate; petioles 2-3 cm. long, tomentose at first, becoming glabrate; bracts short, 5-6 cm. long, 1-2 cm. wide at the apex, tapering to a cuneate base, on stalks 2-2.5 cm. long, overtopping the cymes and flowers; peduncles short, 2-2.5 cm. long, densely pubescent; pedicels very short, 4-6 mm. long; cymes very small, few—(5-12) flowered; branches of the cymes, pedicels and sepals densely pubescent; bractlets at the base of the pedicels oblong-linear, densely pubescent, twice as long as the pedicels and flowers.

TYPE LOCALITY: Morelia, Michoacan.

SPECIMENS EXAMINED: Vicinity of Morelia, Michoacan, *Bro. G. Arsene* 2664, April 11, 1909, TYPE, Arnold Arboretum; N. Y. Bot. Garden, two sheets, *cotypes*.

6. *MILIA COAHUILANA* n. sp.

Twigs rather stout, reddish or brownish, glabrous; winter-buds reddish or brownish, ovate, plump, pointed, 3-4 mm. long, pubescent at ends; leaf-blades orbicular or round-ovate, abruptly long-pointed, truncate or obliquely-cordate at the base, yellowish-green and glabrous above, paler and smooth below, except tufts or yellowish tomentum in the axils of the veins, coarsely serrate or dentate nearly all around; petioles slender, 3-4 cm. long, glabrous; bracts long, 8-12 cm. long, 1-2 cm. wide, slightly narrowed to a nearly sessile base, overtopping the cymes and flowers; peduncles 2-3 cm. long, slender, slightly scabrous; pedicels 5-8 mm. long; cymes medium-sized, few—(5-7) flowered; branches of the cymes and pedicels grayish-pubescent.

TYPE LOCALITY: Monclova, Coahuila.

SPECIMENS EXAMINED: Mountain m. Monclova, Coahuila, *Dr. E. Palmer* 118 U., February to October, 1880, TYPE,

Arnold Arboretum; Mountains called Caracol, 21 miles southeast of Monclova, Coahuila, *Dr. E. Palmer* 118 U., August 19 to 22, U. S. N. H. 1380873, is probably this species.

I have seen three sheets of Palmer's 118, and there are certainly two species under this number, one having the bracts very unequal at the base and long-stalked, the other two plants having bracts equal at the base and nearly sessile. Sargent referred all these sheets to *T. floridana*, but to my mind the one I hereby describe is distinct from that species.

7. *TILIA NELSONI* n. sp.

Twigs loosely brownish-tomentose, becoming nearly glabrous, dark brown or red; winter-buds ovate, plump, obtuse, at first tomentose, becoming blabrous, about 3 mm. long; leaf-blades ovate, ovate-oblong or round-ovate, 8-15 cm. long, 8-12 cm. wide, truncate, obliquely-truncate or subcordate at the base, tapering to a long acute point, the smaller ones subcordate, serrulate nearly all around with sharp apiculate teeth pointing forward, dark green and glabrous above, finely grayish stellate-pubescent below, the principal veins on the lower surface of the leaf more or less brownish-hirsute or pubescent; bracts large, 5-10 cm. long, 1-2 cm. wide, long-attenuate at the base, peduncled, rounded at the apex, much overtopping the cymes and flowers, or sometimes shorter, glabrous above, pubescent or soon glabrous below; peduncles slender, 3-5 cm. long, loosely pubescent, becoming glabrous; cymes medium-sized widely spreading, few—(3-8) flowered; branches of the cymes, pedicels and sepals finely tomentose, brownish or yellowish; flowers middle-sized, 6-7 mm. long; fruits about 6 mm. long, densely grayish-tomentose.

TYPE LOCALITY: Cañon at Omilteme, Guerrero, San Luis Potosi.

SPECIMENS EXAMINED: Cañon at Omilteme, Guerrero, San Luis Potosi, *E. W. Nelson* 7044, May 15, 1903, U. S. N. H. No. 399385, TYPE; N. Y. Bot. Garden, co-type.

8. *TILIA LONGIPES* n. sp.

Twigs very slender, grayish, finely tomentose; winter-buds small, 2-3 mm. long, brownish, ovate, plump, pointed, loosely pubescent; leaf-blades round-ovate, 10-15 cm. long, 6-10 cm. wide, dark green above, lighter and densely finely pubescent below, sharply serrate all around with long slender teeth, obliquely truncate at the base; petioles slender, 5-6 cm. long minutely grayish-pubescent; bracts 10-12 cm. long, 2.5 cm. wide above, tapering to a long cuneate base, on stalks 1-2 cm. long, about as long as the cymes and flowers, densely grayish stellate-tomentose below; peduncles very slender, 4-5 cm. long, minutely grayish-pubescent; pedicels very short, 4-5 mm. long; cymes small, compact, few—(5-10) flowered; bractlets at the base of the pedicels conspicuous, oblong-linear, densely pubescent, twice as long as the pedicels and flowers; branches of the cymes, pedicels and sepals finely and closely grayish-pubescent.

TYPE LOCALITY: Orizaba, Veracruz.

SPECIMENS EXAMINED: Orizaba, Veracruz, *Botteri* 63 pp., about 1855-57, Field Museum 118976, the plant marked 2 on this sheet, TYPE.

9. *TILIA OCCIDENTALIS* Rose, Contr. U. S. N. H. 8: 4. 317. 1905.

T. mexicana Benth. Pl. Hartweg. 35. 1839, according to Engler, l. c. 125, and Sargent in *TILIA*, l. c. 434, not *T. Mexicana* Schlecht., *Linnaea*, 1837.

T. mexicana occidentalis (Rose) Engler, Monog. *TILIA*, 125. 1909.

Bentham's *T. mexicana* was collected near Anganguero, Michoacan, (not Anganguio as given by Sargent) by Hartweg, and may not be the same as *T. occidentalis*.

Michoacan, Engler, l. c. 126.

S. Andreia? *Hartweg* 276, Engler, l. c. 126.

Anganguero, Michoacan, *Hartweg* 276, Engler, l. c. 126.

Patzcuaro, Michoacan, *Pringle* Pl. Mexic. 4126, Engler, l. c. 126.

Twigs stout, brownish-tomentose, becoming glabrate; winter-buds ovate, plump, blunt, reddish or brownish, glabrous, about 3 m. long; leaf-blades round-ovate, obliquely truncate or truncate cordate at the base, 8-10 cm. long, 6-8 mm. wide, abruptly short-acuminate, dark green and glabrous above, more or less coarsely stellate-pubescent with brownish tomentum below when young, finally becoming nearly glabrous, the primary veins below shaggy brownish or yellowish, coarsely serrate; petioles 3-4 cm. long, stout, covered with brownish or yellowish spreading tomentum, or nearly glabrous when mature; bracts small, 5-12 cm. long, 1-3 cm. wide, rounded at the broad apex, subsessile or very short stalked, glabrous above, or sometimes stellate-pubescent, glabrous below, much shorter than the cymes and flowers; pedicels slender, 5-10 cm. long, loosely hirsute or pubescent, brownish or yellowish; cymes large, wide-spreading, many—(10-30) flowered; branches of the cymes, pedicels, sepals and fruits densely short-hirsute, brownish; flowers rather large, 7-8 mm. long.

TYPE LOCALITY: Patzcuaro, Michoacan.

SPECIMENS EXAMINED: Mountains about Patzcuaro, Michoacan, Pringle 4126, July 22, 1892, TYPE, presumably in the U. S. N. Herbarium, but no specimen seen from there; Field Museum 264023; Univ. of Minnesota 152877; Iowa State College 42443, and Arnold Arboretum; vicinity of La Parada, Oaxaca, E. W. Nelson 999, August 19, 1894, U. S. N. Herbarium 866456, labeled *T. Houghii*.

In the original publication of *T. occidentalis*, Rose includes Nelson's 6874, collected at base of Mount Tancitaro, Michoacan, in his new species, but this is certainly far from Pringle's 4126, and I am describing it as new.

10. *TILIA HOUGHII* Rose, Contr. U. S. N. Herb. 8: 4. 318. 1905.

TYPE LOCALITY: Cuernavaca, Morelos.

T. mexicana Simk., l. c. according to Engler, l. c. 126, not *T. mexicana* Schlecht, 1837, but Engler had in mind a different species.

T. mexicana Houghii (Rose) Engler, Monog. TILIA 126, 1909, as to combination, but not as to specimens cited to support this combination, which belong to a different species.

Oaxaca, *Galeotti* 4158 and 4198, according to Engler l. c. 126, but no doubt a mistake on the part of Engler, as no specimens are known of this species from the State of Oaxaca.

Cuernavaca, Morelos, *Pringle*, Pl. Mexic. 10264, according to Engler, but Engler is in error as to this, as it is not *T. Houghii*, and Engler did not know the real *T. Houghii*, never having seen it.

"Leaves nearly orbicular, 10-15 cm. long by 8 to 12 cm. broad, abruptly short-acuminate, somewhat oblique at base with a broad shallow or moderately deep sinus, very pale and densely stellate-pubescent beneath, dark green and glabrous above, the margin sharply serrate, the winged peduncle subsessile, very broad, obtuse, not reaching the cyme, pedicels and buds densely stellate-pubescent, almost white" ex Rose.

"The large broad leaves which are much paler beneath and covered with a finer pubescence, distinguish this from *T. mexicana*" ex Rose. But this species is not to be compared to *T. mexicana* Schlecht, but it might be compared to *T. mexicana* Benth., which is *T. occidentalis* Rose. "Collected by J. N. Rose and Walter Hough in a mountain canyon above Cuernavaca, Morelos, May 27-30, 1899, No. 43.98," ex Rose.

"Leaves 6 to 16 cm. long, 4.5-12 cm. wide, abruptly short-acuminate, obliquely truncate to cordate at base, bright green and glabrous above, densely and persistently tomentulose beneath; bracts sessile or pedunculate; petals 6 to 7 mm. long; fruit about 7 mm. in diameter, densely tomentulose."

"Michoacan, Oaxaca, Hidalgo, Morelos and Veracruz" ex Standley. This description is evidently drawn from several specimens, as no specimens of *T. Houghii* are known from Michoacan, Oaxaca, Hidalgo or Veracruz, and it is probable that Standley regarded Pringle's 10264 the same as *T. Houghii*, and it is quite clear that Engler did.

Twigs yellowish-gray, densely tomentose-hirsute, rather stout; winter-buds brownish, ovate, plump, obtuse, pubescent,

about 3 mm. long; leaves very large, nearly orbicular, 11-12 cm. long, 8-12 cm. wide, abruptly short-acuminate, nearly symmetrical at the base or subcordate, dark green and glabrous above, very pale and densely short stellate-pubescent below with easily detached tomentum and tufts of brownish tomentum in the axils of the veins, sharply serrate all around with moderately small, sharp teeth; petioles short, stout, 2-2.5 cm. long, densely clothed with loose grayish or in age deciduous pubescence; bracts rather large, 8-10 cm. long, 1.5-2 cm. wide, nearly sessile, glabrous on both sides, strongly reticulated, but little longer than the cymes and flowers; peduncles slender, 3-4 cm. long, grayish-pubescent; pedicels stout, 4-6 mm. long; cymes rather large, many—(15-20) flowered; branches of the cymes, pedicels and sepals loosely yellowish-white, the buds just beginning to open.

11. *TILIA PATZCUAROANA* n. sp.

Twigs rather stout, densely fulvous-tomentose; winter-buds reddish or brownish, ovate, plum, blunt, about 4-5 mm. long; leaves round-ovate, abruptly long-acuminate, cordate at the base, scarcely unsymmetrical, 10-18 cm. long, 10-14 cm. wide, minutely serrulate all around, dark green and glabrous above, yellowish below with stellate-pubescence; petioles stout, 3-4 cm. long, densely pubescent with fulvous spreading pubescence; flowers and fruit not seen.

TYPE LOCALITY: Patzcuaro, Michoacan.

SPECIMENS EXAMINED: Hills of Patzcuaro, Michoacan, *Pringle* 3578, November 21, 1890, TYPE, Arnold Arboretum; vicinity of Morelia, Michoacan, *Bro. G. Arsene* 5355, December, 1910, Arnold Arboretum, I refer here with some doubt, but as it is only a leading shoot, no certainty can be placed on any determination.

12. *TILIA SARGENTIANA* n. sp.

T. Houghii Rose, Standley, and other Am. authors, in part.

T. Houghii Engler, Monog. *TILIA*, 126, 1909, not *T. Houghii* Rose, 1905, being misled by the name on the labels.

T. mexicana Simk. in Math. es termesz. Koslem. 22: 7. 315. 1888, according to Engler, l. c. 126, but evidently not the *T. Houghii* Rose, nor the present species, as no specimens are known of either except the type collections.

T. Houghii Schneider, according to Engler, l. c. 126, but Schneider was evidently misled by the name on the labels.

Twigs grayish or yellowish-tomentose, thick; winter-buds reddish or brownish, ovate, blunt, 3-5 mm. long; leaves round-ovate, oblong-ovate or deltoid-ovate, very oblique at the base, or sometimes truncate or rounded, abruptly pointed at the apex, 5-10 cm. long, 5-8 cm. wide, deep green and glabrous above, yellowish or brownish below with fine, close, stellate-tomentum, the principal veins on the under surface of the leaf not very conspicuous and more or less appressed-hirsute, reddish or brownish, minutely serrulate or denticulate all around with apiculate teeth; petioles short, stout, 2-2.5 cm. long, yellowish or brownish-tomentose like the midvein; bracts very small, 5-6 cm. long, 5-10 wide, tapering to a sessile base, narrowed at the apex to a blunt point, glabrous on both sides, somewhat overtopping the cymes and flowers; peduncles slender, 2-2.5 cm. long, yellowish or brownish-tomentose; pedicels stout, 10-15 mm. long; cymes very small, few—(2-6) flowered; branches of the cymes, pedicels, sepals and fruit yellowish-pubescent; both flowers and fruit on the twigs; fruit nearly globose, 5-6 mm. long.

Compared with *T. Houghii*, with which this has been confused, this has leaves scarcely one-half as long and of an entirely different shape, petioles much longer and as compared with the size of the leaf, very much longer, fewer-flowered cymes, pedicels more than twice as long, larger and plumper winter-buds, much smaller bracts, and a brownish appearance. It is with great pleasure that I associate Prof. Sargent's name with this handsome-appearing and distinct species of *TILIA*, of which he had already indicated as new on one of the labels.

TYPE LOCALITY: Cuernavaca, Morelos.

SPECIMENS EXAMINED: Wet mountain canyon above Cuernavaca, Morelos, *Pringle* 10264, July 30, 1906, U. S. N. Her-

barium 462281, TYPE; University of Minnesota Herbarium 152921; Field Museum of Natural History, 202193; Deam Herbarium.

13. *TILIA ROSEANA* n. sp.

T. cordata Rose, in Herb., not *T. cordata* Mill. 1759.

T. caroliniana vagans Engler, Monog. *TILIA*. 132. 1909.

Twigs brownish-red, or at first grayish-pubescent, slender, glabrous; winter-buds brownish-red, ovate, plump, pointed, about 3 mm. long; leaf-blades round-ovate, tapering to a long acute point, 5-12 cm. long, 5-8 cm. wide, dark green and glabrous above, grayish with fine, dense stellate-pubescent below, the principal veins on the under surface very prominent, yellowish, sharply serrulate all around, except at the bases, with low, broad, apiculate teeth pointing forward, the base of the leaf truncate or subcordate, the smaller ones deeply cordate; petioles long, 3-4.5 cm. long, very slender, glabrous, yellowish like the midveins; bracts small, 5-10 cm. long, long-tapering at the base, broader at the upper ends, glabrous above, minutely pubescent or glabrous below, on stalks about 6 mm. long, much shorter than the cymes and flowers or sometimes longer; peduncles very slender, 2.5-4 cm. long, minutely pubescent or glabrous; pedicels very short, 5-7 mm. long; cymes small, few—(5-7) flowered; flowers small, 4.5-5 mm. long; branches of the cymes, pedicels and sepals closely minutely tomentose.

TYPE LOCALITY: Honey Station, Hidalgo.

SPECIMENS EXAMINED: Wet bluffs of the barranca below Honey Station, Hidalgo, *Pringle* 10800, September 21, 1908, TYPE, Deam Herbarium: El Chico, State not given, *Ehrenberg*, date not given, N. Y. B. G. Herb.

14. *TILIA PERTOMENTOSA* n. sp.

Twigs stout, densely tomentose with coarse brownish hairs; winter-buds brownish-red, ovate, plump, obtuse, 3-4 mm. long, hairy at the ends; leaves ovate, broad-ovate or ovate-oblong, 7-12 cm. long, 5-9 cm. wide, dark green and

glabrous above, densely short-tomentose below with brownish hairs, nearly entire or minutely serrulate on the margins, obliquely truncate at the base, or the smaller ones subcordate or truncate-cordate; petioles rather long, 3-4 cm. long, stout, yellowish brown like the twigs; bracts large, 8-12 cm. long, 10-15 mm. wide, very unequal at the base, peduncled, rounded at the tip, glabrous above, loosely stellate-tomentose below or at length glabrate, much exceeding the cymes and flowers; peduncles stout, 2-3 cm. long, loosely tomentose, with brownish hairs, at length glabrous; pedicels very short, 3-5 mm. long; cymes very small, few—(3-7) flowered; branches of the cymes, pedicels and sepals brownish-tomentose.

TYPE LOCALITY: Mount Tancitaro, Michoacan.

SPECIMENS EXAMINED: North slope of Mount Tancitaro, Michoacan, *E. W. Nelson* 6874, February 23, 1903, U. S. N. H. 399225, TYPE.

15. *TILIA ARSENEI* n. sp.

Twigs rather stout, densely yellowish-tomentose; winter-buds brownish, ovate, plump, obtuse, densely pubescent, about 3 mm. long; leaves round-ovate, 10-15 cm. long, 7-10 cm. wide, truncate or subcordate at the base, dark green and glabrous above, grayish and densely stellate-pubescent below, obscurely serrulate all around or nearly entire; petioles very short, stout, 1-2.5 dm. long, densely yellowish-hirsute-tomentose; bracts very large, much exceeding the cymes and flowers, 10-18 cm. long, 2-2.5 cm. wide, finely and conspicuously reticulated, on stalks 8-12 mm. long, glabrous on both sides, the stalks and midribs densely pubescent; peduncles 3-4 cm. long, loosely pubescent; pedicels 5-10 mm. long; cymes small, congested, few—(5-10) flowered; branches of the cymes, pedicels and sepals densely yellowish-tomentose.

TYPE LOCALITY: Morelia, Michoacan.

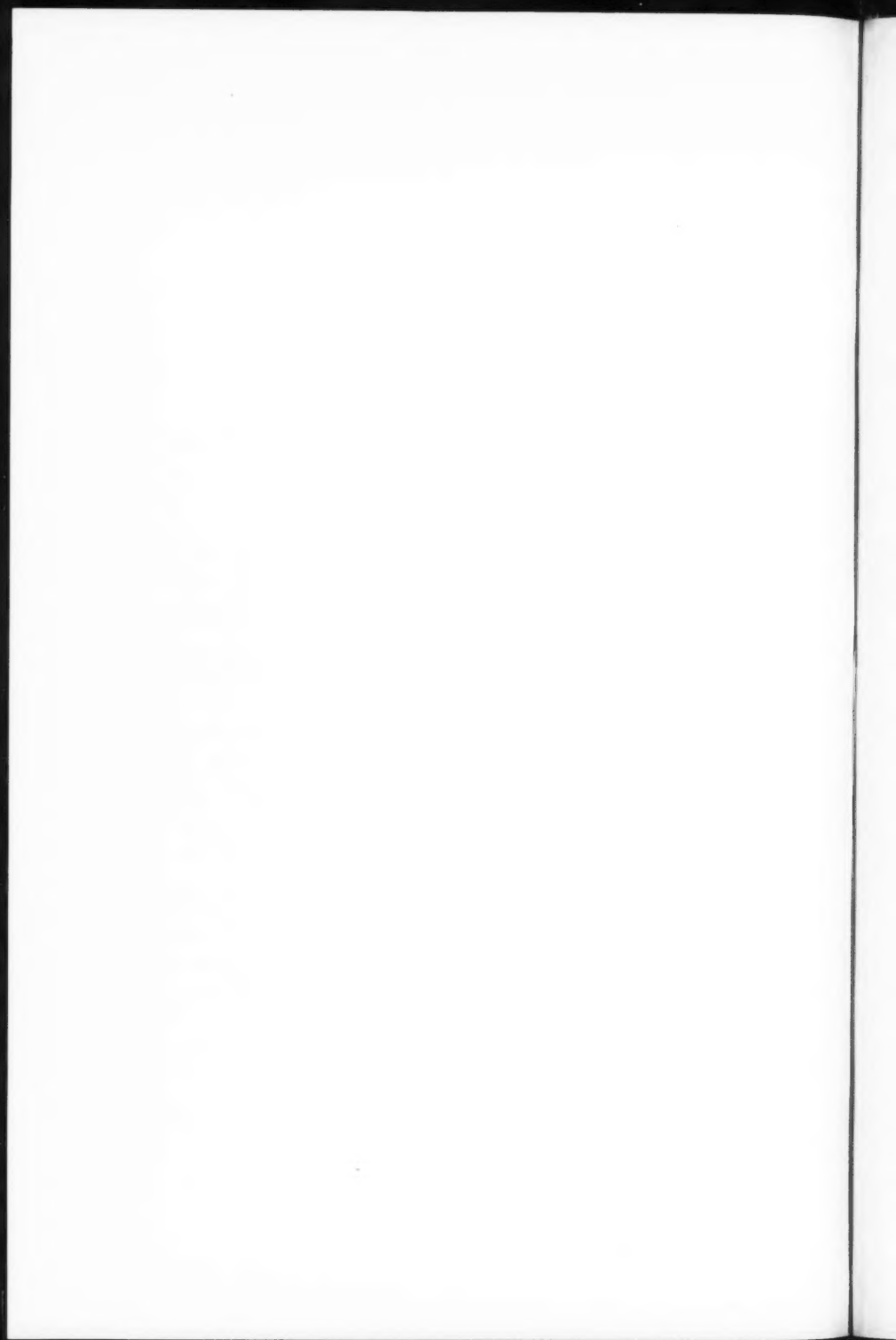
SPECIMENS EXAMINED: Vicinity of Morelia, Michoacan, *Bro. G. Arsene* 2534, May 5, 1909, TYPE, Arnold Arboretum.

Book Review

ANTS, BEES AND WASPS, A RECORD OF OBSERVATIONS OF THE HABITS OF THE SOCIAL HYMENOPHERA. By Sir John Lubbock. E. P. Dutton & Co., New York, 1929. 377 pages. \$3.75.

This is a book for all entomologists, in fact, for all lovers of nature, for it can be read by the layman. The writer uses an easy, familiar style that has a peculiar charm. But for all its literary charm, the book is really a record of observations carried on according to the most rigorous scientific canons. And these observations were not mere chance observations, made at random. Lubbock kept an ant's nest under constant observation for more than seven years. He applied the same meticulous care to the study of bees and wasps. Though done nearly a century ago, Lubbock's work is still standard. The annotations by Dr. J. G. Myers are just what was wanted to bring the book up to date. There is a table of contents and a good index.

F. W.—



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